Multifaceted, Neurological-based, Adaptive Toy to Enhance Learning and Therapy in Autistic Children

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Introduction

- Autism is a multifaceted neurological disorder that affects the four fundamental aspects of sensory processing, communication mechanisms, elusive social interaction skills, and whole child/self-esteem
- In the United States alone it is estimated that 1 in every 50 children has autism, which translates to about $3.2 million per person in additional medical expenses over their lifetime.
- A durable, effective therapy is best achieved through various multifaceted, multidisciplinary approaches that are directly linked to the underlying neurological mechanisms.

Objective

- The aim of this project is to simulate, design, manufacture, and assess a toy that can help cultivate sensory, social, communication, and motor skills in autistic children.
- Develop toy with interchangeable panels to allow for hundreds of variations in order to progress with the child’s development and preference and increase replayability.
- Incorporate statistical and visual feedback to accurately evaluate patient’s symptoms and progress.

Background & Significance

- Extremely key to remedy autism as early as possible, allows for increased time to develop deficient skills.
- Emotional responses to others’ emotions and surroundings lag. Fail to allocate attention properly.
- Lack of motor skills plays major role in impairing social & communication skills.
- Reward based stimulation through lights and sounds encourage amusement, motivation, and improvement.

Points of Emphasis

- Focus on allocating attention more accurately and effectively.
- Develop motor skills in order to treat social & communication skills.
- Toy should be goal oriented; over difficulty may cause frustration.
- Congratulatory responses promote increased toy usage and satisfaction.
- Feedback systems for therapists and parents to analyze and evaluate development.

Modeling

- Path panel (easy):
  - Button activity
- Path panel (medium):
  - Top view – Displays of varying path difficulty as well as button activity
- Interchangeable panels – Increasing levels of difficulty further strengthens motor skills and maintains replayability.

Feedback & Evaluation

- Key concept is to integrate feedback with toy to ensure patients are developing concurrently with toy usage.
- Camera and real time button activity statistics primarily used to track patient improvement.

Structural Analysis

- Base Drop Displacement Test - Indicates areas of displacement throughout key.

Conclusions

- The toy combines both motor skill development and sensory development into one toy, which are both critical in enhancing social and communication skills.
- Interchangeability of the activities ensures patients will not quickly exhaust a specific task, maintaining incentive to engage with toy.
- By monitoring the child’s progression using cameras and completion statistics, therapists and parents can appropriately evaluate and reward their behavior.

References